Name:

at1124exam: Radicals and Squares (v821)

Question 1

Simplify the radical expressions.

$$\sqrt{99} \qquad\qquad \sqrt{27} \qquad\qquad \sqrt{50}$$

$$\sqrt{3 \cdot 3 \cdot 11} \qquad\qquad \sqrt{3 \cdot 3 \cdot 3} \qquad\qquad \sqrt{5 \cdot 5 \cdot 2}$$
$$3\sqrt{11} \qquad\qquad\quad 3\sqrt{3} \qquad\qquad\quad 5\sqrt{2}$$

Question 2

Find all solutions to the equation below:

$$3(x+6)^2 - 5 \;=\; 70$$

First, add 5 to both sides.
$$3(x+6)^2 = 75$$

Then, divide both sides by 3.
$$(x+6)^2 = 25$$

Undo the squaring. Remember the plus-minus symbol.

$$x + 6 = \pm 5$$

Subtract 6 from both sides.
$$x = -6 \pm 5$$

So the two solutions are $x = -1$ and $x = -11$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 10x = -16$$

$$x^2 - 10x + 25 = -16 + 25$$
$$x^2 - 10x + 25 = 9$$
$$(x - 5)^2 = 9$$
$$x - 5 = \pm 3$$
$$x = 5 \pm 3$$
$$x = 8 \qquad \text{or} \qquad x = 2$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 3x^2 + 30x + 83$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 + 10x) + 83$$

We want a perfect square. Halve 10 and square the result to get 25 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 + 10x + 25 - 25) + 83$$

Factor the perfect-square trinomial.

$$y = 3((x + 5)^2 - 25) + 83$$

Distribute the 3.

$$y = 3(x + 5)^2 - 75 + 83$$

Combine the constants to get **vertex form**:

$$y = 3(x + 5)^2 + 8$$

The vertex is at point $(-5, 8)$.